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EDITORIAL NOTES

EFFICIENT USE OF FUEL

DURING the war period the need for the efficient use of fuel has rightly been impressed on all concerned, by lectures, by fuel economy bulletins, and by the visits of technical experts to factories and works. Truly remarkable results have been achieved, and the nation's wheels have been kept turning ever faster in spite of a progressive fall in the output of coal. The savings in fuel which have been realized even in well-managed works by adherence to the principles which have been instilled during this campaign have reached enormous figures, but further efforts are still required.

The necessary impetus will be provided by the publication by H.M. Stationery Office, on behalf of the Ministry of Fuel and Power, of a book which deals comprehensively with all aspects of this all-important subject. The book is entitled *The Efficient Use of Fuel: A Text-book on Fuels and Their Efficient Utilization for the Use of Students and Technical Men in Industry*, and it has been "prepared under the direction of the Education Sub-Committee of the Fuel Efficiency Committee of the Ministry of Fuel and Power." A foreword by Major Lloyd George, the Minister of Fuel and Power, refers to the vital importance of the effective use of fuels of every kind, and expresses his trust that the book will be of permanent value to all those concerned with the industrial use of fuel. In their preface, Dr. R. J. Sarjant, Chairman of the Education Sub-Committee, and Dr. E. S. Grumell, Chairman of the Fuel Efficiency Committee, mention that "Each individual chapter has been submitted for approval to panels of experts on the particular subject under review, and they have in many cases subjected them to certain criticism and revision. It is thus apparent that every means has been taken to ensure that the book is as authoritative as possible, free from personal bias, and appreciative of the practical outlook The book was originally intended to emphasize the 'application of knowledge,' and, arising out of this attempt to be practical, the preparation of certain chapters has indicated where information is lacking, and the Committee hopes to explore these untrodden paths in the near future." We wish them all success in their promised efforts.

The list of contributors to whom acknowledgment is made is so lengthy that we can indicate only a few of those who have helped. In mentioning the names of Professors Lander, Riley, and Turner, Drs. Braunholtz, Chesters, Dunstan, Fishenden, Griffiths, and Mott, and Messrs. Dieterichs, Lubbock, Reavell, Thring, and Webber, we are conscious that we are doing an injustice to many whom we might equally well have singled out.

The book, profusely illustrated and available at the modest price of 12s. 6d., has been given a publicity greater, we cannot help thinking, than any technical work has ever previously received, for advertisements in the national Press have brought it to the notice of many millions of readers. There is, therefore, no excuse for anyone to be unaware of its existence, or for anyone who can properly make use of it to delay in securing a copy. We must ask our readers not to be misled by the advertisements into thinking that the low price at which the book is sold is indicative of a slender treatise. When we saw the book we were, indeed, amazed. It contains approximately 800 pages of text, averaging 700 words to the page where diagrams and tables are absent, whereas a more usual figure is in the neighbourhood of 400–500 words per page. However, the title-page clearly confirms the price mentioned in the advertisements. We doubt very much whether it would ever have been possible in normal circumstances to secure the public-spirited collaboration of the host of eminent experts necessary for the compilation of such a work, and we are certain that, even if its publication had been entrusted to the most altruistic of publishers, the selling price would have had to be at least five times as much.

The contents cover so wide a range that it is impossible to make more than brief reference to them here. Detailed information is given of all types of liquid, solid, and gaseous fuels, furnaces, electrical included, boiler plants, driers, water treatment, scaling of metals, heat transmission, thermal insulation, chimney draught, flow of fluids, flue gas losses, and heat balances, and many other topics, too numerous to mention, also find their place. The treatment is essentially practical, with adequate and clear explanations of the principles involved, much helpful advice, many tables of essential data and worked-out examples showing how they may be applied for the solution of every-day and unusual problems. In many cases a masterly survey of recent work has been made, and its implications have been interpreted for the guidance of the reader without the obtrusion of a mass of complicated mathematics which, if it did not discourage him, would at least involve much hard thinking and give rise to some unpleasant headaches.

It will be evident that the Editor had a very formidable task in not only assembling and co-ordinating all the information, but in contributing much of it himself. Dr. G. E. Foxwell, who undertook this heavy burden of responsibility, has achieved a magnificent result. We think that no one will dispute that, with his enthusiasm and experience, he was the ideal man for the purpose, or question the success which he has attained. Industry has long been in need of such a book, and may be trusted to make good use of it now that it is available. We confidently expect that the book will not only become a best seller, but that it will be one of those exceptional books which are read over and over again, and each time provide fresh inspiration and stimulus.

HEATING THE HOME

JUST published is the report of the Solid Fuel Installations Committee convened by the British Coal Utilization Research Association at the request of the Minister of Works and the Minister of Fuel and Power. It is complementary to those of the Gas Installations Committee, whose report issued some time ago has been fully reviewed in these columns, and of the Electrical Installations Committee convened by the Institution of Electrical Engineers. The last-named report is a severely factual one covering a great deal of ground—houses, flats, schools, hospitals, and farm buildings—setting out recommendations regarding service and control arrangements, including telecommunications. In considering general domestic applications the Committee believes in freedom of choice, and also that the war has brought about a big potential demand for electric cookers. Hence its recommendation that every post-war dwelling should be wired for the provision of an electric cooker; "horizontal" arrangement of oven and hotplate and thermostatic control of the oven are advocated. In regard to water heating, the design of a 20-gallon multiple unit heater is suggested, and, where solid fuel is used, there should be provision for an immersion heater in the hot water tank for "topping up" and for summer use. Concerning space heating, about which not much is said, it is recommended that more consideration should be given to the thermal insulation of dwellings, and once again we have what we consider the retrograde advocacy of the omission of chimney fireplaces and flues.

"FREEDOM OF CHOICE"

THE report of the Solid Fuel Installations Committee is confined to the "single-family dwelling"—the small house or flat. Here, again, the report opens on the note of full freedom of choice between solid fuel, gas, and electricity—a choice restricted, however, by the consumer's pocket and by general housing and fuel policy. The national considerations are set out as the need for low-cost housing, for smoke abatement, and for balancing fuels in relation to peak loads, for "if serious peak loads are allowed to develop in the case of a particular fuel as the result of free consumer choice, this will ultimately be reflected in an increase in the price of that fuel to the consumer which may tend to alter the original choice." There is much to be said for the Committee's contention that the climate of this country is such that if dwellings are to be healthy to live in, some form of continuous heat release must be in use during several months of the year. There follows the advocacy of slow-combustion methods and continuous burning, combined with means for rapid pick-up. On account of peak loads and the fact that solid fuel can be stored in individual premises, the Committee suggests that solid fuel must continue to supply a considerable proportion of domestic fuel requirements, and that "the economic use of our national coal resources requires that the most appropriate fuels should be used for each particular purpose," which may necessitate some limitations of the principle of freedom of choice. There are firm recommendations regarding adequate provision for fuel storage.

It is argued that low capital cost of appliances, if accompanied by high fuel consumption, is the reverse of an economy either to the individual or to the nation, and that the inefficiency of many solid fuel appliances in the past led to criticism of solid fuel *per se* when the fault lay largely with the appliances rather than the fuel. The Committee, in fact, bases its recommendations on the belief that, through improvement in appliances burning solid fuel, and acceptance of the principle of continuous burning, the service given to the householder can be greatly increased. But whatever comes, "the domestic consumer will demand and have to receive properly organized service in every field of solid-fuel consumption."

SMOKELESS FUELS

THE report strikes us as being a glimpse into a possible future rather than an account of solid fuel installations as we know them. All the recommendations, it should be noted, take into account the use of coke, and it is emphasized that smokeless fuels give higher efficiency. The size of firebox of new appliances, it is urged, should be determined in relation to the least dense fuel, ensuring that coke can always be employed, and the same argument applies to the range of control provided over the air supply.

As we have said, the Committee looks to the acceptance of appliances operating on the principle of slow combustion. In its report it concentrates on comparisons between a continuous burning space heater with closeable open fire and a pre-war stool bottom grate; and between a combination grate of the open-fire type, with side oven and back boiler relit every day, and an improved multiple-duty unit envisaged, with side oven and side boiler burning continuously, with closeable fire and insulated hot water tank and pipes. The conclusions drawn are in the form of estimated savings transferred into capital cost of appliance. With the first comparison it is assumed that with coal at £3 a ton, the new appliance could stand an increase in price of over £12 on the basis of a life of 10 years; with the second comparison, the figure is given as £30 on the same basis. On the basis of 20 years' life the figures become £20 and £51 respectively. We have mentioned these assumptions merely as indication of the general tenor of the report, which speaks of unproved things which may eventuate, but do not seem to be with us now or appear likely to be with us on the cessation of war. The report is interesting but one of aspirations rather than a series of recommendations based on what can be offered immediately, and in this regard is in sharp contradistinction to that of the complementary report of the Gas Installations Committee of The Institution of Gas Engineers.

MAJOR PROBLEMS

THAT the Paper by Mr. G. E. Currier which we published last week stimulated much thought was evident from the discussion which followed its presentation at the meeting of the Manchester District Association of Gas Engineers. The Author asked many questions in considering three of the four major problems—Gas Industry problems—with which he dealt. The three problems to which we refer, coal supplies, appliances and meters, and research, are exercising the minds of all of us to lesser or greater degree, and the questions put in the Paper are much to the point. A method of providing answer to the questions was advanced by the Author in the final section of his contribution—that covering ownership and integration. At the moment we do not intend to assess the merits or demerits of the cut and dried scheme of public ownership (as distinct from national ownership) of the Industry, *via* Trustees appointed by Parliament, and Central and Regional Gas Boards, so ardently advocated—not for the first time, as witness our correspondence columns—by Mr. Currier. That strengthening of the internal organization of the Industry to enable it to expand in the better service to the community which is its avowed aim is generally admitted; and as we have said before, some element of compulsion would seem inevitable if the strengthening envisaged, whatever the form it ultimately takes, is to be effective. We hope to see the light more clearly when the Ministry of Fuel's Committee at present taking evidence from the Industry issues its findings.

In the course of his Paper Mr. Currier spoke of the appalling waste which accompanies the present system of coal supply to the Gas Industry. The matter of ash content alone is one of grave difficulty; it costs money to pay for inert material and its transport, and ultimately its handling away from the plant. Through increased wear and tear resulting from the feeding of ash to the carbonizing plant, the reduction in plant capacity, and the increase in fuel requirements of the plant, huge sums of money are unnecessarily thrown away. At the same time gas undertakings have to take supplies of coal which, apart from ash content, are not those properly suited to the systems of carbonizing which they operate. Post-war, if the Industry is to give that service to the community which it knows it is capable of giving, it must be assured of suitable coals, low in ash; it must be able to select its coals. Previously we have referred to the report of the Solid Fuel Installations Committee, and the hopes therein expressed of future solid fuel appliances working on the slow-combustion principle. It is recommended in that report that coal or coke fed to the proposed appliances should have an ash content not exceeding 6%. The aspirations of the Committee will certainly be impossible of fulfilment if the Gas Industry continues to be supplied with coal of the quality it now has, willy nilly, to take.

"PACKAGE KITCHENS"

WE do not like the term "package kitchens" to describe the complete unit comprising cooker, refrigerator, wash boiler, sink, and cupboards and fitments—a unit designed and built in one complete ensemble, which can be installed as such, more particularly in new houses, but also in existing dwellings where space and planning permit. Mr. Currier referred to these "package kitchens" in his Paper, expressing the hope that manufacturers of gas appliances would do something about their development and be prepared to market such units embodying gas appliances after the war without undue delay.

Actually the Gas Industry, individual gas undertakings, and the appliance makers are not being idle in this regard—far from it. As example we publish in our issue to-day an illustrated description of the model kitchen on unit lines which Radiation Ltd., in collaboration with a firm of chartered architects, have erected at their London premises at Stratford Place. The

Radiation kitchen, displayed under excellent conditions, is a most practical contribution to the matter which Mr. Currier has in mind. It is interesting, attractive, definitely modern, and—this not the least important—economically appealing. The display does in fact go beyond the kitchen, providing a combined gas and coke system for satisfying the fuel requirements of the type of house designed for those of modest means and giving a very high standard of comfort and convenience.

Personal

Mr. HARRY HOPKINSON, who has been Secretary to Chester United Gas Company since 1926, is shortly to retire. He will be succeeded by Mr. T. LIONEL JONES, Assistant Secretary since 1932. A native of Bury, Mr. Hopkinson joined the staff of the Company in 1898 as a junior clerk. Three years later he was promoted chief clerk, and in 1926 he was appointed Secretary in succession to Mr. Frederick A. Pye. The fact that between 1898, when at the age of 20 he started with the Chester United Gas Company, and 1944 the service of the Company had been almost quadrupled was mentioned at presentations made at Quaintways on Oct. 26.

Mr. William Cullimore (Chairman of Directors) made the presentation on behalf of the Board of Directors, and Mr. T. Lionel Jones on behalf of the staff and employees.

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The Board of Directors of the Liverpool Gas Company have appointed Mr. W. W. B. STODDART to fill the vacancy created by the death of Mr. Stuart Vernon Cox in September.

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Mr. J. G. BENNETT, Director of the British Coal Utilization Research Association, has resigned this position to take up the post of Technical Director of new plastics research laboratories to be established in London jointly by the Powell Duffryn Companies and De la Rue Plastics, Ltd.

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Mr. S. G. ASH has been appointed Secretary of the Exeter Gaslight & Coke Company in succession to the late Mr. E. H. Dart. Mr. Ash has been the Accountant to the Company since January, 1935.

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Officials of the Stoke-on-Trent Gas Department have made a presentation to Mr. J. WARRILLOW, Works Manager at Etruria, who has retired after 60 years' service. The presentation took place at a social function at the works. Mr. J. E. Stanier (Chief Engineer and General Manager) spoke of his long association with Mr. Warrillow and of the happy relations which had always existed between him and the staff. Paying tribute to Mr. Warrillow's long service to the Industry, he said he had worked under seven different Engineers and been invaluable to all of them.

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Mr. J. F. FORD, Deputy Gas Engineer to the Darlington Corporation, has been appointed Manager and Secretary of the Kettering Gas Company and will take up his duties in December. A native of Manchester, he started his career with West's Gas Improvement Company, Ltd., and held an appointment at Northampton before moving to Darlington in 1929 as engineering assistant. He was appointed Deputy Gas Engineer in 1939.

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L.t-Col. W. E. GIBBONS, lately elected National Conservative M.P. at the recent Bilston bye-election, is a Director of Messrs. Gibbons (Dudley), Ltd., and Messrs. Gibbons Brothers, Ltd., whose works are situated in his constituency. Col. Gibbons, after serving in the last war, was occupied in the Companies' business until 1939, when he took command of the local Territorial Battalion of 1/6th South Staffords. For the last two years he has been in charge of a Battle School in Northern Ireland.

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Mr. ALBERT WHATMORE, M.I.Mech.E., has resigned the position of General Manager to Messrs. J. & J. Braddock and joined the staff of the Parkinson and Cowan group. On leaving Messrs. Braddock's Mr. Whatmore was presented with a timepiece by the staff.

* * *

Mr. JAMES MACPHERSON, Technical Assistant and Chemist to the Stirling Gas Light Company since 1941, has been appointed Assistant Engineer and Manager. Mr. Macpherson was trained at the Perth Corporation Gas-Works.

Under Their Scheme of weekly collection on behalf of Edinburgh charities, the employees of Alder & Mackay, Ltd., have donated £277, allocated as follows: Edinburgh Royal Infirmary, £171; Sick Children's Hospital, £45; Queen's Institute of District Nursing, £61.

Letter to the Editor

Institute of Fuel Education Scheme

DEAR SIR,—In the Editorial Notes of your issue dated Oct. 25 you have raised several interesting points relative to the Institute of Fuel. You ask, "What is a fuel technologist?" For the purpose of the Education Scheme of the Institute, a fuel technologist is a qualified engineer, chemist, or chemical engineer who has acquired a special knowledge of fuels and of their production or utilization, and is competent to apply his knowledge.

An examination of this Education Scheme and of the Articles which govern membership of the Institute will show that a fuel technologist in this sense must have a satisfactory background education in Mathematics, Physics, Chemistry, and Engineering Science, be able to show that he has a thorough and fundamental knowledge of coal and of its preparation and uses; also a first-class knowledge and experience of at least one major fuel industry.

You will recollect that in August, 1939, the Institute applied for a Royal Charter, but, unfortunately, the consideration of all such applications has been suspended for the duration of the war. The Institute, therefore, at an Extraordinary General Meeting held in April last amended its Articles of Association so that the clauses governing membership should be identical with those in the proposed Charter. These came into force at once and involved the formation of an Education Scheme.

In developing this, the Institute has been concerned to make the fullest possible use of existing educational and training facilities, and a detailed examination of the Scheme will show to anyone that no facilities, professional or otherwise, have been overlooked, and that the scheme does not overlap the "specialized education and examination systems of other professions." All the professions have, of course, a more or less common educational background before specialization begins, and the fuel technologist is not an exception to this rule.

The war has shown that there is a great national need for qualified fuel technologists. This was first recognized officially by the Ministry of Fuel and Power, and is reflected in the setting up of special post-graduate courses in this subject; in the educational aspect of the great fuel economy drive; and in the great number of lecture courses and demonstration centres operated by the Ministry throughout the country; with, finally, the publication by the Ministry of a text-book on the efficient use of fuel.

The new Articles of Association were so drafted and the Education Scheme is being developed so that the flexibility which has been such a prominent feature of the Institute in the past is actually extended and not restricted by these changes. In short, the constitution has been extended to include professional status for qualified fuel technologists.

It is too early yet to detail the way in which our information service is to be developed, but it will not in any way usurp the position of consultants or trespass upon services which are already adequate.

P. C. POPE,
Secretary.

The Institute of Fuel,
30, *Bramham Gardens,*
London, S.W. 5.
Nov. 1, 1944.

Coke Oven Managers' Association

The 29th Annual General Meeting was held in London on Oct. 28, when Mr. J. Bradwell handed over the Presidency to Mr. E. Harrison. Mr. W. N. Warwick was elected Vice-President. Following the business meeting, at which Mr. Harrison gave his Presidential Address, the annual luncheon was held. The Minister of Fuel and Power, Major Gwilym Lloyd George, was among the large number of distinguished guests.

Mr. H. Cecil Booth was in a reminiscent mood at the recent 40th annual meeting of the British Vacuum Cleaner and Engineering Co., Ltd., when he reviewed the early days of the vacuum cleaner, which, in its industrial form, is helping substantially to raise the standard of cleanliness in many gas-works in this country to-day. Mr. Booth scarcely foresaw the present wide application of the suction principle when at the dawn of the century he produced his invention, gave a command demonstration to King Edward and Queen Alexandra at Buckingham Palace, and became the central figure at a series of Mayfair "Vacuum demonstration tea parties." To-day the Company's products are to be found in hundreds of thousands of homes and, in the words of the Company's slogan, "the world will be a cleaner place when they are made again." Probably bearing in mind the large number of gas undertakings using vacuum cleaners, Mr. Booth remarked that "one can cook by gas, light by gas, refrigerate by gas, launder by gas, but, although we ourselves experimented a good deal in the early days, it has never been found possible to clean the home by gas." There are wide fields of industrial use of suction conveying plant and air filtration, among which boiler-sooting and ash-conveying plant are modern features of boiler-house equipment as developed by the Company. In many specialized industrial applications, the system is proving not only of great value to plant engineers, as, for example, in the Gas Industry, but also in improving working conditions of that class of labour normally condemned to "dirty work" processes.

"The Efficient Use of Fuel"*

The drive for fuel economy is of major importance to the war effort, and will be of equal importance for the reduction of costs of production after the war. The progress which the Fuel Efficiency campaign has made has aroused in the minds of those engaged in industry a desire to know more of the subject. Lectures, works visits, and brains trust meetings which have been held in all parts of the country under the auspices of the Ministry of Fuel and Power have been attended by some 20,000 engineers, works managers, boiler and furnace operatives, and others. The desire has been repeatedly expressed at these meetings that an authoritative text-book should be made available containing a permanent record of the subject-matter of these discussions and lectures. This book, *The Efficient Use of Fuel*, has now been issued as a comprehensive work to meet this need, and has been designed to give the whole story of the practice and principles of fuel utilization. In preparing it the Fuel Efficiency Committee of the Ministry of Fuel and Power has had the co-operation of over 200 experts, comprising most of the leading authorities on fuel utilization in the country.

In undertaking this task the Committee realized that no single existing text-book covers both the fundamental principles and the essential operating features necessary to obtain satisfactory results. The result is unique in that for the first time there has been gathered into one volume material for which previously it would have been necessary to consult perhaps 20 or more standard books. It is written in a form easily understandable, and is equally suitable for students of all ages and for the busy man in the works. The Minister of Fuel and Power in his foreword says: "This book, in which has been assembled a very great deal of information not readily available, will not only serve the present urgent need, but will be of permanent value to all those concerned with the industrial use of fuel."

Each of the 34 chapters into which the book is divided has been submitted for approval or criticism to a panel of experts in that particular branch of the subject. The nature and properties of all industrial fuels, solid, liquid, and gaseous, are discussed, together with the effects of combustion. Information is given on such important matters as draught and chimney design, combustion technique, air supply and flue gas composition, clinker formation and prevention. The transmission of heat and the calculation of fluid flow are explained at some length; an important section is the complete analysis from first principles of the flow of gases in a furnace system. Steam production, including boiler practice and testing, and steam utilization are comprehensively treated. The measurement of fuels (solid, liquid, and gaseous) and of steam is described, and particulars are given of how to make measurements on site. Six chapters are devoted to furnaces, including gas producers, furnace management and technique, the application of fuel to special industries, electric furnaces, waste-heat boilers, and refractory and insulating materials.

The remainder of the book consists of information on a variety of subjects that are of the highest importance in fuel utilization, such as central heating, the technique of drying, and thermostatic control. Plant used for town gas (such as governors, burners, thermostats, valves, and motors) is described. Petroleum and its utilization as a fuel and the important subject of graphical heat balances are allotted chapters, while others are devoted to instruments, the sampling of solid and gaseous fuels, the analysis of coal (in which the meaning of coal analysis is explained simply for the practical man). The final chapter discusses the selection of the various fuels for industrial purposes. Three short appendices deal with the Fuel Research Coal Survey with steam tables and with entropy.

[*Editorial comment on this new work appears on p. 603*]

* Published by H.M. Stationery Office. 34 Chapters, viii + 807 pp., 303 illustrations. Price 12s. 6d. net, 13s. post free.

Winter Coal Ration

The Ministry of Fuel and Power has announced that the maximum quantity of house and kitchen coal and "Coalite" which may be supplied (except by licence from the local fuel overseer) during the three months Nov. 1 to Jan. 31 inclusive is 15 cwt. in the South of England, or one ton in the North of England, Wales and Scotland. The maximum stock limits are one ton and 25 cwt. respectively.

The maximum aggregate quantity of coke, small anthracite, small Welsh dry steam coal and manufactured fuels (other than "Coalite") which may be supplied without licence in any part of England and Wales and Scotland during the period is 15 cwt., with a stock limit of one ton.

The Ministry states that the house coal supply position remains exceedingly difficult, and it is essential that the strictest economy in the use of all forms of fuel be exercised this winter, if serious hardship is to be avoided during the colder weather.

The new restrictions will apply to all controlled premises except those which are specially notified that a certificate of exemption has been issued by the regional coal officer. All hospitals, schools, and other educational institutions (including those exempt from previous Directions) are therefore subject to the restriction on supplies from Nov. 1 unless they receive a special notification to the contrary.

No carry-over is permitted of quantities not supplied during previous restriction periods.

Newport Model Kitchen

On Oct. 16 a Model Kitchen was opened by the Mayor of Newport at the Showrooms of the Newport (Mon.) Gas Company. The kitchen has been planned for the Newport Housing Committee by the Borough Architect, Mr. C. F. Ward.

Erection of the kitchen is the work of Messrs. E. W. King & Son (Newport), Ltd., and the fixing of appliances has been carried out by the Gas Company.

In the planning of the kitchen due cognizance has been taken of all types of lighting and heating agents, and the combination of electricity, gas, and solid fuel is utilized to give the greatest advantages to the housewife and the most efficient and economic use of each agent.

The kitchen has an area of 143 sq.ft., and incorporates adequate accommodation for food preparation and storage as well as washing and drying facilities. All the apparatus is fitted in the centre, so that the whole of the pipe system, including services, wastes, and flues, can be carried in a central duct. By this method, while none of the pipes or cables are visible, access is readily available for inspection, cleaning or repairs. The central duct acts as a ventilator for the whole of the cooking and washing operations, so that steam is carried away and pleasant conditions are always obtained. Adequate cupboard space is provided for use in the most convenient position. Separate hot and cold water taps are installed at the correct height for filling buckets, thus avoiding lifting the buckets to sink height and the possibility of damage.

The cooker is of the latest Radiation "New World" high-level design, with the hotplate at the side of the oven. An Electrolux gas operated refrigerator built-in model is installed, and is of ample capacity for a normal family.

The washing machine, made by Messrs. Barker & Turner, is of special design. The heating of the water is carried out by gas, and electricity operates the wringer and agitator. A gas-heated drying and airing cupboard is installed.

The main space heating and the supply of hot water are provided by a solid fuel stove in the living room (made by John Wright & Co., Ltd.), in which the fuel consumption can be set within very fine limits. Two radiators are run from this apparatus to heat the kitchen and hall. As an auxiliary method of heating the water during the summer period when space heating is not required a small gas circulator is installed, while an "Ascot" boiling point gas water heater gives instant boiling water or hot water at the sink when the other methods are not in use.

Industrial Statistics

In his Address as Chairman of the Association of British Chemical Manufacturers, Dr. P. C. C. Isherwood, O.B.E., referred to the Association's attitude to industrial statistics. If, he said, industry is to play the part expected of it by the Government, it must be provided with all the necessary statistical data that for the most part must come from official sources. Thus import and export statistics should be provided by the Government, and above all, must be available promptly and in all necessary detail. The compilation and supply of these returns should be part of the prime service of H.M. Customs and Excise and not, as in the past, done in spare time by certain officials.

These overseas trade data, he continued, should not be spoilt by the practice of suppressions, even though of course there may be occasions when it would suit an importer or exporter if data relating to a particular consignment were suppressed. On balance, if there is complete disclosure, more will be gained than lost.

As regards the provision of production data, there should be again as much disclosure and promptitude as is compatible with the national interest. Many sections of the industry are already arranging to supply data to the office of the Association, and this will be in considerably more detail than we can reasonably expect a Government to adopt.

London Juniors

The Opening Meeting of the current session of the London and Southern District Junior Gas Association was held on Oct. 27 at Gas Industry House—the retiring President, Mr. B. W. Dawkins, in the chair at the outset.

Mr. Dawkins invested the incoming President, Mr. R. F. Twist, of the South Metropolitan Gas Company, with the Collar of Office, in doing so paying tribute to Mr. Twist's work on the Council of the Association and wishing him a happy and successful year as President.

Thanking Mr. Dawkins and the members, Mr. Twist mentioned that at the last meeting of the Joint Council of the British Junior Gas Associations Mr. Dawkins had been elected Chairman of that body.

Mr. Twist then gave his Presidential Address, "Aspects of Science in the Gas Industry," showing how design and operation in the Industry have moved steadily forward under the influence of applied science. The Address will be dealt with subsequently in the "JOURNAL."

A vote of thanks to Mr. Twist was proposed by Mr. L. W. Andrew (Senior Vice-President) and seconded by Mr. E. O. Rose (Portsmouth), the reply of the President bringing a well-attended meeting to a close.

Gas in South Africa

Following a record of unbroken progress over a period of 16 years, the City of Johannesburg Gas Department had a very successful year in the period ended June 30, with an increase of 8.4% in the quantity of gas produced over the previous year. Mr. J. G. Curnow, Engineer and Manager, in his annual report, states that the total make for the year was 1,195,278,600 cu.ft., an increase of 92,738,400 cu.ft. over the year ended June 30, 1943, and he gives a table showing the amounts of gas produced each year since the present gas-works were established at Cottesloe in 1928–29. In the first year the total was 136,713,100 cu.ft.; in 1933–34 it had risen to 264,808,100 cu.ft.; and in 1938–39 the total was 760,896,700 cu.ft.

Some interesting comparisons are drawn between the last pre-war year, 1938–39, and the year under review. Sales of gas rose from 714,262,000 cu.ft. to 1,111,147,100 cu.ft., capital expended on plant from £996,673 to £1,220,159, and interest and redemption charges from £57,154 to £70,795. The gross profit for the last pre-war year was £53, and for last year £23,740. The increased profit is noteworthy in view of the higher capital charges and working costs which have to be met in abnormal circumstances.

Practically the whole of the additional gas-making plant ordered 4½ years ago has been placed in commission and assisted appreciably in meeting the demand for gas during the peak load last winter. The carburetted water gas plant has been in operation almost continuously since it was placed in commission in March, 1943, the water gas made in the year under review amounting to 165,116,200 cu.ft. In the past all silica refractory materials used in the construction of the retorts have been imported. Steps have now been taken to have these materials manufactured locally. Samples of the locally manufactured silica bricks were sent overseas, and a report received shows that the local product is comparable with the imported article in so far as refractoriness, specific gravity, &c., are concerned. To meet the large demand for gas, the City Council has approved of tenders being invited for an additional retort house consisting of 16 retorts, producers, coke and ash handling plants, waste heat boilers, and water-softening plant at an estimated cost of £225,000. The output from the additional plant will be 1,500,000 cu.ft. of gas per day. It is anticipated that it will take at least 2½ years to complete, and as far as possible the plant will be manufactured locally.

Distribution difficulties at distant points of supply and in low-lying areas have been largely obviated by the installation of a boosting and pressure equalization plant. Another difficulty still to be overcome is the elimination of the water vapour which passes to the districts with the gas, and to overcome this difficulty the Council has agreed to tenders being invited for a gas-drying plant. Distribution mains were kept in good order, and the proportion of gas accounted for in 1943–44 was 93%, compared with 91.5% for the previous year. No large mainlaying operations were undertaken during the year, but every endeavour was made to increase the load factor by obtaining the greatest possible number of consumers on the existing mains. Mains extensions totalling 41,787 ft. brought the total length of mains to just over 427 miles.

A total of 32,966 tons of coke and 788,149 gallons of crude tar were produced during the year. Revenue from coke sales fell from £34,312 to £32,007, but sales of tar and distillates brought in £16,789 against £14,836. There are 13,159 main gas consumers as against 12,702 at the end of the last financial year, in addition to many thousands of sub-consumers living in blocks of flats, &c.

University of Leeds

At its meeting on Oct. 18 the Council of the University gratefully accepted the following generous gifts from Mr. Charles Brotherton:

(1) £1,000 a year under deed for seven years for the establishment of a new Lectureship in Chemical Engineering in the Department of Coal Gas and Fuel Industries.

(2) £1,000 a year under deed for seven years for the establishment of a Brotherton Research Fellowship in Physical Chemistry tenable in the Department of Colour Chemistry and Dyeing.

(3) An additional sum of £1,000 to each of the two Departments for the purchase of equipment.

After a re-arrangement of degree courses in the Fuel Department in 1942, a separate curriculum was established in Chemical Engineering; this requires four years' study, and is intended to provide instruction particularly in plant design and in the so-called unit processes of the chemical industry. It meets the special need of those passing either into the contracting side of the Industry or into the chemical industry generally. The provision of up-to-date equipment and highly trained staff in such technological departments is costly, and the University has largely to rely on the support of industry.

In 1942 Mr. Charles Brotherton provided two Scholarships in either Chemical or Gas Engineering, and this number has since been increased to four. In 1943 he also provided a Brotherton Research Assistantship in Chemical Engineering, and his latest generous gift to meet the further staff and equipment needs of this new field is most opportune; it should materially help to establish one of the best training-grounds in the country. The need is vital, for British Universities have been unable during the years between the two wars to make advances comparable with those in America.

Clearing the Air

Although many of its public activities have been suspended during the war years, the National Smoke Abatement Society has carried on with quiet persistence its work, which did so much to make the nation conscious of the evils of atmospheric pollution during the earlier years of the century. In particular, it has been studying and placing before the Government proposals for smoke prevention in reconstruction.

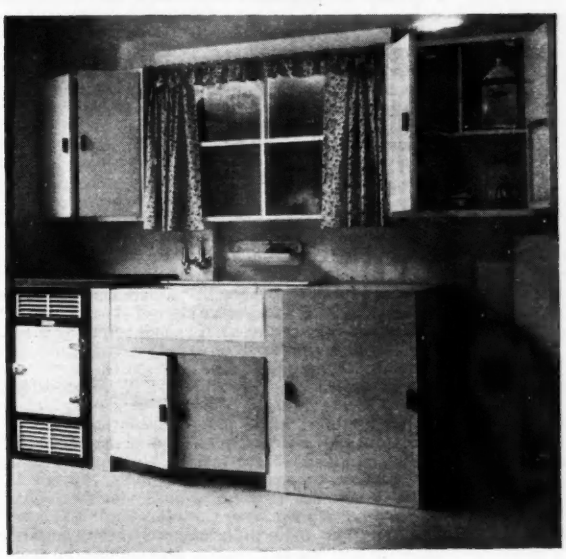
Some of the results of this work are apparent in the *Housing Manual* recently published by the Ministry of Health. Indeed, the Society's case could hardly be put better than in the following paragraph from the *Manual*: "The Government and the industries concerned are alive to the need for developing domestic fuel appliances and installations designed to give greater efficiency and to reduce the emission of smoke. Recently, both together and separately, they have sponsored an increasing volume of research towards this end. There is now a widespread demand that the evil of atmospheric pollution shall be resolutely attacked, one of its principal causes being the inefficient combustion of raw bituminous coal in the home. The Government attach particular importance to smoke abatement in view of the injury to health and to general amenities caused by atmospheric pollution. The extra labour for the housewife is another evil result which must not be overlooked."

The Society has prepared its programme for the next five years, divided probably into three main sections—the formation of public opinion, further research on problems of air pollution, the study of formulation of measures for smoke prevention. Some of the methods by which these objects will be achieved include new publications of general and specialized interest, national and local exhibitions, conferences and meetings, educational work in schools, research into economic losses and other consequences of smoke, development of industrial fuel economy and the education of boilermen, advisory and intelligence services for members and others, and the study of air pollution problems other than those due to coal smoke.

At a Social Evening on Oct. 14 a number of employees of the Broadstairs Gas Company were presented with long-service certificates by Mrs. A. Wells, wife of the Engineer.

Mr. J. Watt, Brass-shop Foreman with Messrs. Sawer & Purves, has retired after over 50 years' service with the firm. On behalf of all employees and staff the Chairman, Mr. J. Morley, presented him with a wireless set.

The Employment of Polish Soldiers at Falkirk Corporation Gas-Works as stokers and labourers was the subject of a protest at the monthly meeting of the Falkirk Town Council. Treasurer Logan, in reply, pointed out that the Poles had been engaged in the ordinary way as ordinary workmen, getting ordinary wages and conditions. The Gas Manager, Mr. H. G. Ritchie, explained that a number of men had been directed from the Labour Exchange to work at the gas-works, but after a trial they had not been able to stand it. If it had not been for the Poles he could not have guaranteed the town any gas during the past few weeks. The Gas Manager's action in employing Poles was approved by 12 votes to 2.



The Stoke-on-Trent Gas Department shows how the kitchen in the larger type of house can be modernized and equipped. An account of the Department's activities in this direction was given on p. 549 of the "JOURNAL" of Oct. 25.

Sulphur and Atmospheric Corrosion

By R. J. S. THOMPSON, B.Sc., A.I.C.

ATMOSPHERIC corrosion of metals, particularly iron, has been the subject of much investigation, and many theories have been advanced to account for the phenomenon. Most of the earlier theories introduced carbon dioxide as an essential compound, and perhaps the most widely accepted theory a few years ago postulated that corrosion occurred only in the presence of oxygen, moisture, and carbon dioxide through the medium of carbonic acid.

This theory is no longer generally accepted, and the later theories, which have a sound experimental basis, are of unusual interest to the Gas Industry and merit the closest attention of gas engineers. An excellent outline of the present state of the knowledge on the corrosion of metals in air was given by Dr. W. H. J. Vernon and was reported in *Chemistry and Industry*, vol. 62, No. 34, p. 314.

Briefly it has been established that:

(*a*) Iron can rust at temperatures well above the dewpoint.

(*b*) Rusting of iron in air proceeds from centres where particles of dust have settled.

(*c*) The immediate corroding agent is an acid, usually sulphur dioxide.

(*d*) Carbon dioxide has a repressive rather than a promoting action.

At humidities below 50–65% iron and steel appear to become covered with a protective layer of oxide. Between 50% and 65% humidity the oxide film appears to break down, but serious corrosion does not occur. Above 80% humidity, however, corrosion becomes general and very rapid.

Gas engineers have long been aware that iron and steel rust at a negligible rate in gas dried to a relative humidity of 40%. In this country a large proportion of the town gas supplied is partially dried to this extent, and the practical advantages of the process are well established. The results given above indicate that humidity of the gas should be kept below 50%, and certainly should not exceed 70% at any part of the district.

The fact that rusting proceeds from centres where particles have been deposited is of considerable interest. Experiments have shown that while almost any kind of particle will act as a centre of rusting, certain kinds of particle are extremely active. Of these, charcoal is many times more active than any other material which has been tried. In an industrial area the particles most likely to be deposited on steel constructions are carbonaceous, and their activity in promoting corrosion is likely to be of the same order as that of the charcoal used in the experimental investigation. The principal sources of carbonaceous particles are domestic fires, industrial furnaces, boilers, &c., using raw coal. The fine dust emitted from power stations and by some industries is also likely to be active in promoting corrosion.

The predominating agent in atmospheric corrosion, however, is sulphur dioxide. Even in the absence of dust particles, sulphur dioxide at humidities above 80% promotes corrosion, while particles of materials like charcoal and silica in the absence of sulphur dioxide produce only very slow corrosion. Silica increases the rate of corrosion of sulphur dioxide by perhaps 5–10%, but charcoal increases the rate many-fold. A salt like ammonium sulphate takes up an intermediate position. The significance of these facts is that the elimination of carbonaceous particles from the atmosphere will produce a substantial reduction in the corrosion of iron and steel, but that corrosion will continue at a substantial rate so long as sulphur dioxide continues to be produced and exhausted to atmosphere. Thus, the case for prohibiting the burning of raw coal is very strong, but this alone is not sufficient. All fuels used must, as far as possible, be sulphur-free.

Carbon dioxide is an acid gas, but a very weak one, and experiments have shown that the presence of carbon dioxide is neither necessary nor conducive to rusting. The final product of atmospheric rusting is a loose basic carbonate of iron, but there appears to be no doubt that the primary reaction in the course of rusting is the solution of the metal by sulphurous and sulphuric acids derived from sulphur dioxide and moisture from the atmosphere. The basic carbonate is a secondary product produced initially in the surface layer of the iron solution, resulting from the corrosion by the sulphurous and sulphuric acids.

It is well known that in the presence of oxygen a small amount of corroding acids or salts can produce very deep-seated corrosion of iron and steel by the process of anodic oxidation. The iron oxide or carbonate produced acts as a porous screen underneath which the solution of the metal continues indefinitely. The ferrous salts produced are oxidized, iron oxide is precipitated, and the acid radicle released to continue the attack of the metal. No doubt a similar process occurs in the case of atmospheric rusting. The effect of particles deposited on the surface may well be to provide the necessary screen so favourable to the process.

In the article referred to above it is claimed that atmospheric pollution is almost wholly responsible for atmospheric corrosion, principally the products of combustion, and that of these "sulphur dioxide is by far the worst offender." The confident prediction is made that if the complete removal of sulphur dioxide from flue gases can be secured, "atmospheric corrosion will very largely cease to be a problem."

The Gas Industry has already come to the conculsion that its own interests will be best served by the sale of sulphur-free gas. If the Industry succeeds in producing sulphur-free gas it will be making a real contribution to the serious problem of atmospheric corrosion. It will be favourably placed to continue business if the time comes that the full significance of the effects of sulphur dioxide are realized and legislation is introduced, limiting or restricting the emission of this gas.

The production of sulphur-free gas for sale is a step in the right direction, and is one to which the closest attention should be given by the Industry.

Training and Qualities of the Gas Engineer

(Discussion on Mr. G. C. Pearson's Institution Paper, concluded from p. 474)

Mr. Walter T. Dunn:

As to how "the better type of men available" can be attracted to the Gas Industry seems to me to warrant the setting-up of a Conference having only that question for discussion and report. Education of the highest order should be brought within the reach of those having the ambition of entering the Industry. I suggest that the respective Senates of the Universities of Oxford and Cambridge should be approached with the ultimate object of establishing a course of study definitely described as for the acquisition of a degree in Gas Engineering, the holders of which might be designated "Masters of Gas Engineering" or "Doctors of Gas Engineering." This, one supposes, would mean adding a Professor of Gas Engineering to the professorial staff, and would entail money for endowment, as in the case of the Livesey Memorial Professorship at the University of Leeds.

The Institution's own education scheme has produced some good results, and doubtless a number of men now holding responsible positions in the manufacturing, distribution, and commercial departments of the Industry owe to it their progress and advancement. A complete knowledge of the workman whom he will ultimately have to manage can only be fully secured by working with him day by day, in the shops, &c. The old apprenticeship system, which apparently seems to be dying out, gave every opportunity for this knowledge to be acquired. Steel, iron, wood, and other materials are capable of being tested and analyzed chemically, physically, and microscopically. Man is really a material of sorts, requiring understanding. On the workman depends the successful carrying-out of the schemes which the engineer has designed. His co-operation is of vital consequence. How to secure it requires a knowledge and experience of many and diverse characteristics one meets with in the workman of to-day.

The absence of any adequate authorized text-books on the conservation of the nation's coal resources is to be deplored. Can this serious omission not be rectified? The story of the discoveries and development of the Gas Industry are certainly full of romance for the younger generation to enjoy. Then the ever-present question of remuneration cannot be overlooked, for, after all, the remuneration prospects of any profession must be taken into account when a young man is considering which avenue of employment he should enter. The salaries of electrical engineers are regulated according to the output in kilowatts of their generating stations, which would appear quite an equitable plan. Has this system ever been applied to gas engineers?

Dividends

Meters, Ltd.—Interim dividends have been declared at the rate of 4% on Ordinary Stock and 2¾% on the 5½% Preference Stock on account of the year ending March 31, 1945.

United Kingdom Gas Corporation, Ltd.—Interim Dividend of 2½% (actual), less income tax, on the Ordinary Shares for the year ending Dec. 31, 1944, payable on Nov. 16. The payment of 2½% against 2% in previous years is to equalize the half-yearly payments, and should not be taken to indicate an increase in the total dividend for the year.

The Directors of the Peterborough Gas Company have declared the following dividends for the half year to September: £5% per annum on the New Preference A shares, £7½% per annum on the Consolidated Ordinary Stock, both less income tax. Before the Board meeting on Oct. 18, five employees with over 40 years' service each were presented by the Chairman (Mr. A. J. Paten) with a long-service certificate and savings certificates. Making the presentations, the Chairman remarked that he too had completed 40 years as a Director of the Company.

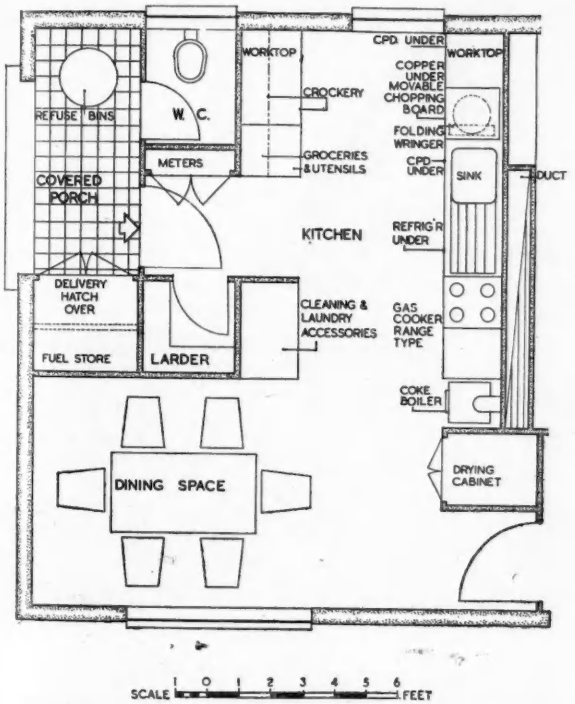
An Ordinary Dividend of 7½%, less tax, was declared at the annual meeting of George Wilson Gas Meters, Ltd., at Coventry on Oct. 30. The accounts for the year ended March 31 showed a profit of £15,480, against £16,549 for the previous year. In view of the inevitable burden of costs which would arise in the transitional period of change-over to peace-time conditions, the general reserve fund had been increased by £3,500 to a total of £13,500. The policy, which was commenced last year, of providing for taxation on all profits earned up to date of the balance-sheet had been continued this year, and the amount required for this purpose was £8,750.

Radiation Display Kitchen

At their London premises at Stratford Place, Radiation Ltd., in collaboration with Arcon, have erected for display purposes a most interesting kitchen as part of a post-war house plan. It is a definite contribution towards the solution of the problem of providing better kitchens in houses intended for those of moderate means.

This Radiation house plan provides for the use in combination of gas and coke; and the plan demonstrates in telling fashion how, by the use of an internal duct, appliances and services can be grouped compactly to avoid heat wastage. The duct houses all the supply and waste pipes, as well as the principal flues for the gas and coke appliances and for kitchen ventilation. Freezing of pipes in cold weather is thereby avoided. Hot water supply is by a Nautilus coke boiler in the kitchen. In addition to heating water for domestic purposes the boiler serves two radiators. A slow combustion solid fuel stove of improved design is fitted in the living-room. This can be used as an open or closed fire at will; during the night, when closed up, only a small amount of fuel is consumed, but sufficient to keep the room warm.

In one bedroom, the large one, background heating can be obtained by means of warm air led by ducts from the stove in the living-room, and a gas fire is fitted to provide additional warmth. In the plan an open coke fire of an improved type is indicated, and in this case the warm air from the slow combustion stove will not be required. Gas fires are provided in the two other bedrooms.



In the entrance hall and on the first floor landing hot water radiators are installed. There is a pipe coil for warming the clothes-drying cupboard, and a heated towel-rail in the bathroom. The hot water storage cylinder warms the linen cupboard.

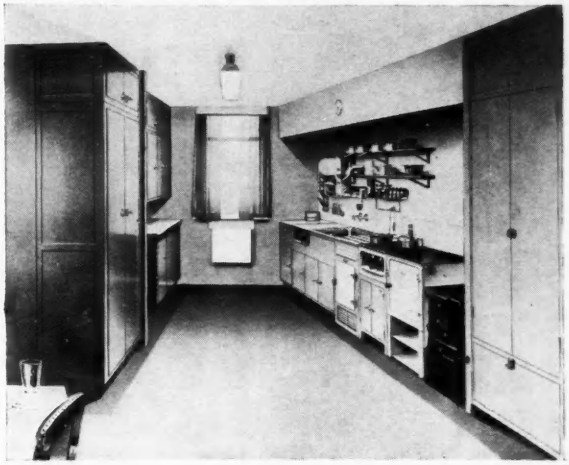
For summer use, should the coke boiler not be lighted, a gas-heated water circulator connected to the storage cylinder is provided, and a gas heating-unit is fitted in the drying cupboard. There is a Nocturne portable gas heater for use as needed in the kitchen or the dining-section.

In the plan of the model house a large part of the ground floor is devoted to the kitchen, an essential feature of which is the dining-section, accommodating a table large enough for the family meals. The accompanying plan illustrates the layout, which may be considered as consisting of two parts. First, the dining section (12 ft. by 7 ft. 3 in.). Here space is provided for six people to sit down to a meal in comfort. Secondly, the working section (10 ft. 10 in. by 7 ft. 9 in.). In this, compactly grouped, is all that is required for food preparation and cooking, laundry work, and household cleaning.

Cooking is by a Regulo "New World" cooker having the hotplate at the side of the oven, which is raised to a convenient height. The kitchen unit has a uniform working level throughout. The inherent cleanliness of the single unit gas-heated wash boiler, stainless steel sink, and drainer will be appreciated by the housewife. The extension of the working surface to cover the wash boiler, complete with folding wringer, is an added convenience. A built-in gas-operated refrigerator is fitted in the space below the draining-board.

A continuous hood extends over the wash boiler, sink, cooker, and coke boiler, and is connected to a flue in the central duct, for venting cooking smells, steam, &c.

In the kitchen is a clothes-drying cabinet of size sufficient to contain



the whole of the family wash. The cabinet is fitted with sliding racks arranged to carry woollens; large items, such as sheets, can be hung from the racks. As mentioned, when the coke boiler is alight, the cupboard is warmed by a pipe coil connected to the boiler, while for use in summer there is a gas heating unit.

The gas meter and the electric meter are placed adjacent to the back door, where they are easily accessible. All meters and fuses are mounted at a convenient height for prepayment and reading and any necessary repairs.

The provision of a delivery hatch enables the housewife to go out whenever she wishes, with the assurance that tradesmen's deliveries will be kept under cover until she returns. Beneath the delivery hatch there is the fuel store. This is intentionally placed outside the back door, so that fuel may be delivered, if necessary, in the absence of the house occupants.

Diary

Nov. 14.—National Federation of Gas Coke Associations: General Committee, Gas Industry House, 10 a.m.

Nov. 14.—N.G.C. Central Executive Board: Gas Industry House, 1.30 p.m.

Nov. 14.—Council of the British Gas Federation: Gas Industry House, 3.30 p.m.

Nov. 18.—Manchester and District Junior Gas Association: Visit to St. Helens.

Nov. 20.—London and Counties Coke Association: Finance Committee, 11 a.m.; Executive Committee, 11.30 a.m.; Central Committee, 1.30 p.m. Gas Industry House.

Nov. 30.—Eastern Counties Gas Engineers' and Managers' Association: Autumn Meeting, Gas Industry House. Papers by Dr. J. G. King and Dr. F. J. Dent.

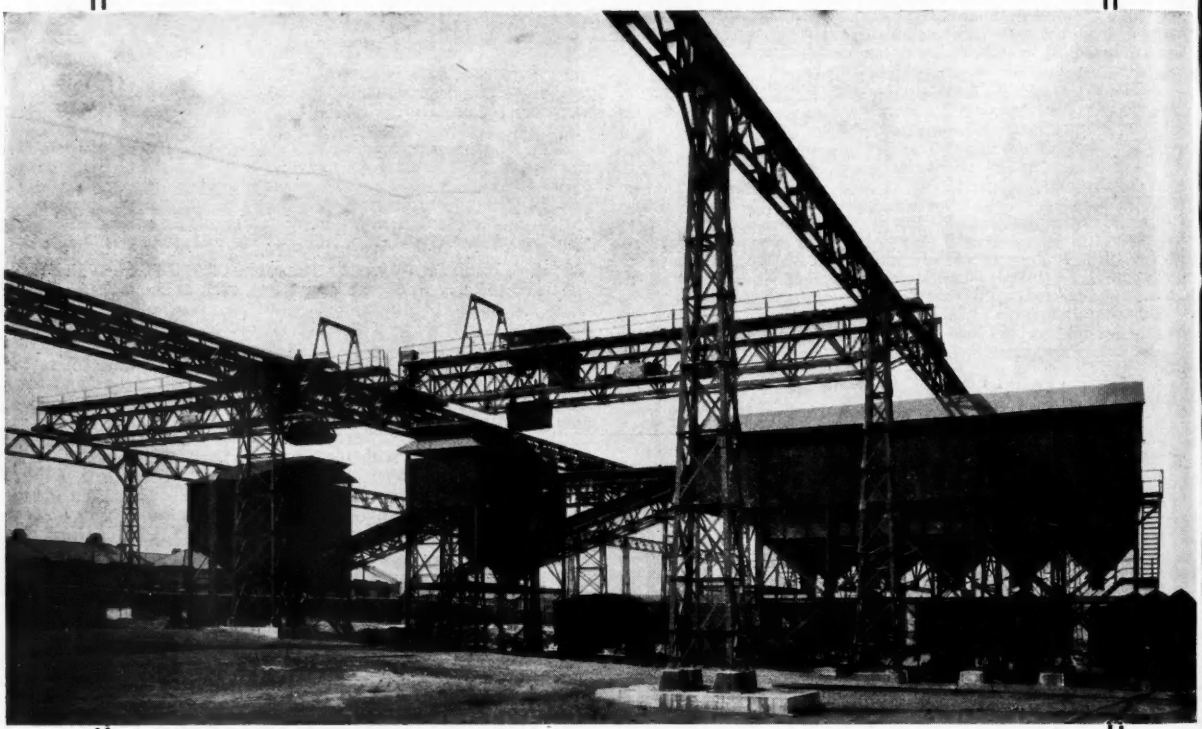
Dec. 5.—Domestic Heat Services Committee: Gas Industry House, 2.30 p.m.

Dec. 13.—Southern Association of Gas Engineers and Managers (Eastern District): Gas Industry House, 2.30 p.m. Paper by C. A. Deas, "Horizontal Retort House Operation and Works Power Supply."

Messrs. Walter Slingsby & Co., Ltd., Keighley, have issued new literature introducing the "Wask" strainer, designed for incorporating into pipe lines immediately in front of steam traps, automatic control valves, reducing valves, &c., for arresting any foreign matter which would damage a seating or render the apparatus inoperative if allowed to pass through. A large capacity well is provided in the body to receive the accumulation of sediment. The strainer is suitable for pressures up to 250 lb. per sq. in., and the present range covers sizes from ½ in. to 2 in. in horizontal and angle type.

MECHANICAL HANDLING PLANT

by Dempster of ELLAND



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A Transportable B.W.G. Plant

The characteristic of transportability has not hitherto been deemed of necessity in regard to water gas plant. None the less, the possibility undoubtedly possesses interest, as there may be scope of useful future application. This description concerns a unit designed and built by the Power-Gas Corporation, Ltd., and used for emergency conditions such as have been encountered during the last few years, but it is equally well suited to meet any type of emergency conditions.

The plant is a single self-supporting unit capable of producing 300,000 cu.ft. of blue water gas per 24 hours from ordinary coke. The generator raises all of the steam required, and all machinery, including an automatic mechanical operator, is driven from a single internal combustion engine.

The original design envisaged that the plant would be transported as a complete unit, and its dimensions were so arranged as to be accommodated within one of the low-slung road trailers available in this country, and to suit the roads over which carriage might be necessary. It was eventually decided, however, to modify the construction into two sections, to give a wider choice of available transport.

The two illustrations show the plant as fitted up before despatch from the maker's works, and in two sections as in course of transport. It will be noted that some of the simple auxiliaries, such as stack pipe and the jib for fuel hoisting, are dismantled for transport.

The water gas generator is arranged as a jacket boiler for a working pressure of 50 lb. per sq.in., and is of completely welded construction, with the necessary doors and frames. The cycle of operation is that employed in normal blue water gas production, with blow and up and down runs. The control valves are operated by a mechanical operator which automatically controls the sequence of the cycle and includes interlock safety devices. The water gas is cooled and washed in a coke-filled scrubber, and can then be passed to the gasholder.

The centrifugal blower delivering air for the blast or blowing period is driven by the internal combustion engine which simultaneously drives the mechanical operator, a boiler feed pump for the jacket boiler, and a small dynamo to provide electricity for the coke hoist. The air is measured by a short venturi meter of special design, and the instruments, all of which are grouped on a central board, comprise pressure gauges, air meter, steam meters, and clock. The boiler is provided with all of the usual mountings, including automatic feed control and high and low level water alarm.

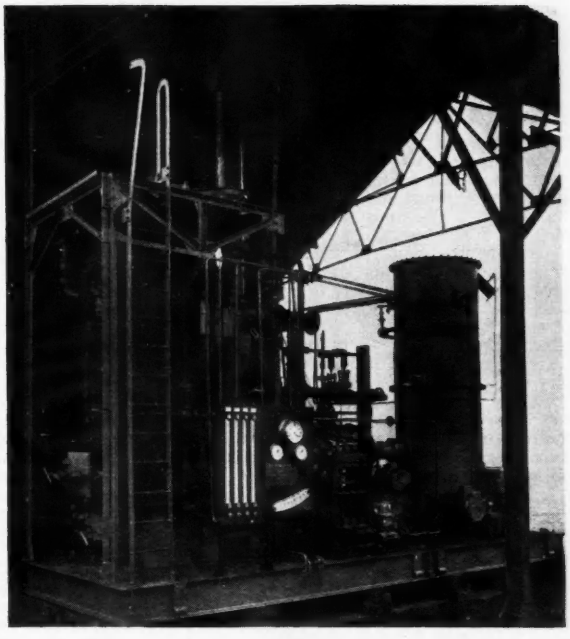
On completion of the first plant in the works of the Power-Gas Corporation, Ltd., Stockton-on-Tees, it was despatched by road to a gas-works 200 miles away, for immediate use. Shortly after starting to work, a test over several days under ordinary working conditions showed an average output of 14,000 cu.ft. hourly, with a coke consumption in the generator of 44½ lb. per 1,000 cu.ft. The coke contained 22% ash and moisture, and the gas analysis was as follows:

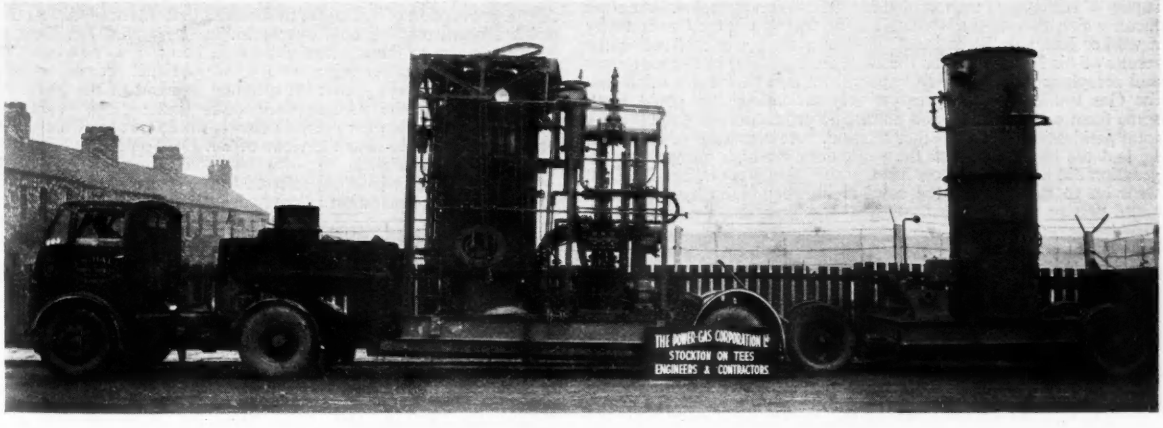
CO_2	CO	H_2	CH_4	N_2
5.6	38.8	48.4	0.6	6.6

Calorific value 284 B.Th.U. per cu.ft. gross at 30 in. Hg and 60°F.

Before and during the test period the plant was operated only for about half of each 24 hour day, and improved results as regards both output and fuel consumption would undoubtedly be obtained under continuous working conditions. The plant was completely isolated from any outside steam source, and the whole of the process requirement was produced from the jacket boiler. With boiler feed water available at a temperature of 130°F., the boiler pressure varied between 50 lb. per sq.in. (during blow) and 45 lb. (during run). Starting with the boiler pressure at zero each morning, the plant was making gas to the holder 15 minutes after start-up.

A plant of this type—that is to say, with boiler jacketted generator to supply all the process steam—could, of course, be built as a stationary unit and arranged for the production of carburetted water gas by the addition of a carburetter and superheater. The coke consumption is higher than what would be obtained in a normal type of generator, but there may be cases where independence of outside steam supply would warrant such a condition.





The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

Production of Gaseous Hydrocarbons by the Hydrogenation of Coal

Composite discussion on the Paper by Dr. F. J. Dent given in turn to the Midland Junior Gas Association, the Midland Association of Gas Engineers and Managers, and the Southern Association of Gas Engineers and Managers, and published in full in the "JOURNAL" of Oct. 18.

THE MIDLAND JUNIOR MEETING

The **President** (Mr. F. J. Bengough) said they were very much indebted to Dr. Dent for speaking on possible future processes of gas manufacture and for the lucid way he had described the underlying experimental investigations, pointing out the difficulties to be faced. The Paper, he remarked, was the outcome of a desire expressed by members of the Association to know more of what research was being done in the Gas Industry. Two years ago they had had the pleasure of hearing Dr. Evans, and last year, Dr. King, and they regarded these occasions as red-letter days in their syllabus. Dr. Dent had now been able to add the experimental detail on which the broader discussions had been based, and to show them the promise of things which might shortly be accomplished. The experiments with a reaction vessel of 7 in. diameter were on a substantial scale for laboratory work, and now that it was possible to continue the work in an apparatus 12 ft. deep, he thought they would agree that an approach was being made to practical-scale units. But it seemed to him that the Industry must not expect too much from these investigations for some time to come, and he thought that it was a pity that they could not see some gradual development of existing processes. He did not refer to present carbonizing processes, but rather to the water gas or the producer side of gas manufacture. He thought that if it were possible to have evolution from them to high pressure gasification, many would look forward more hopefully towards total gasification.

The Industry did not appear to lack inventive genius or competent research staffs, but it did seem to be very conservative. This work began nine years ago, and now was the first time that any progress could be shown. He feared that unless more rapid progress could be made in the future, the Industry would have to turn to other methods of gas manufacture. All were aware of the labour difficulties experienced in the works side to-day. Present methods of gas production were dirty and involved hard manual labour and, for those reasons, there were increasing difficulties in getting the necessary staffs to maintain their plant. He thought these factors would operate against the Industry in the post-war period, and he anticipated that labour would be attracted to industries operating cleaner processes, where mechanical methods were largely employed to eliminate the manual work. If they could not attract the right type of worker, he was afraid that it would have an adverse effect on the supply of the class of men needed for supervision purposes. Another factor which affected the labour situation was that in the Gas Industry a worker had not the satisfaction after a day's work of seeing the results of his labour, as was the case, for example, in the motor-car and aeroplane industries. But apart from that he did not think that the Gas Industry would progress very far unless they could reach some form of mechanical and automatic production of gas either by total gasification or some other method. At one stage of the Paper he had the impression that the work done on high pressure hydrogenation did not lead to a complete gasification process, but Dr. Dent went on to explain that the solid residue from the hydrogenation could best be used for gasification with oxygen and steam in a high pressure generator. The gas so obtained would, after purification, consist of hydrogen and carbon monoxide, and could then be used for coal hydrogenation and be enriched thereby. Dr. Dent had mentioned that such a two-stage process, including the manufacture of the oxygen required, would give 220 therms of gas with a calorific value of 450–500 B.Th.U. per cu.ft. That, he thought, was a very good goal to aim at, and if this figure could be approached they would be more than satisfied. He thought that they could rest assured that the research work was proceeding on the right lines, and they were all anxious to see some practical development arising from it.

Mr. **T. F. E. Rhead** (President of the Midland Association of Gas Engineers and Managers, and member of the Gas Research Board) expressed great appreciation of the concise, lucid, and modest manner in which Dr. Dent had dealt with the results of the hard and sustained work of the enthusiastic band of workers of which he was leader. Obviously great prizes were offered but, equally obviously, only after much more hard work. He (the speaker) had always supported the work, not only for its self-evident aims, but also to enlarge the circle of workers in high pressure technique. Such technique offered great scope in many diverse chemical and engineering directions. If one observed the rules of the game, high pressure technique was quite simple, and had many attractive features. The Paper illustrated the evolution of a process from the laboratory to the pilot stage, and brought out clearly the almost unpredictable factors which increase in size brought in its train.

It was in keeping with others' experience that carbon became less reactive after heating to high temperatures, but it was very striking that additions of sodium carbonate as high as 10% were needed to bring out the maximum reactivity—for example, 1½% in activated coke for mobile producers.

Referring to the "kick" in reaction at a certain temperature, he wondered what would be the maximum temperature attained with increasing rate of hydrogen supply. It was of great interest to note that the maximum activity took place while the temperature was rising and the coal substance decomposing. On the other hand, would it not be possible to re-treat the carbon residue and get further quantities hydrogenated?

Dr. Dent's explanation as to the reason of the non-swelling and non-caking of the ⅛ in. coal appeared to be supported by the speaker's experience some years ago with briquettes composed of coal, coke, and pitch. A preliminary rapid heating at a high temperature produced an exterior coat which prevented, or very greatly reduced, swelling. He would like to know whether the "wave-of-reaction" which spread through the charge leaving 50–60% residue acted selectively on any particular form of carbon, or compounds, in the coal.

Mr. **Bengough** asked what the impurities in the gas would be and to what extent the present ancillary plant at a works could be simplified. It occurred to him that no exhausters would be needed, but that extra condensers might be required. None of the present types of ammonia washers, purifiers, or benzole washers should be necessary. If the benefits of high pressure gas manufacture were to be employed to the best advantage for high pressure distribution, high pressure storage holders would be needed and these might be of smaller capacity, since the new system would be flexible as regards the rate of gas production. Could Dr. Dent give them an idea of the composition of the gas likely to be made, and what effect it would have on the water vapour and other constituents of the products of combustion from flueless heaters?

Mr. **V. H. Deacon** (Birmingham) considered that such an instructive Paper should put their minds at rest as to the resumption of a research which, owing to war conditions, had been delayed through lack of hydrogen. He was sure that when the war was over progress would continue, and Dr. Dent's remarks had been most encouraging. What struck him most was the reference to the possibility of the solid residue being used for other purposes. While this was interesting in view of its special properties, he did hope that the Gas Research Board would put that idea out of their minds. In the Industry they thought it best to "get rid of their own stuff," and if the residue could be used for the production of hydrogen, that was all that was needed. Another point concerned using coal over ⅛ in. in size. Had Dr. Dent any information as to the effect of sized fuel, because, as he himself had stated, continuous operation with pulverized fuel seemed to be an ideal way of conveying coal in, through, and out of the plant. He thought that, if the process were discontinuous, the problem of charging and discharging pressure vessels would be somewhat serious, and he would like to hear the views of Dr. Dent on the hydrogenation of pulverized material.

Mr. **K. L. Pearce** (Bilston) referred to the residue and the proposal to use it for the generation of the hydrogenating gas. Was there, he asked, likely to be a proper balance here? Would all the hydrogenating gas be used or would there be an excess of it? He endorsed the comments made about alterations to manufacturing plant. Obviously the Industry could not at one fell swoop suddenly replace its carbonizing plant, even if the results of the semi-scale tests now being carried out were successful. Many years would elapse before the present plant could be scrapped in favour of these new processes. He was particularly interested, therefore, in the lecturer's remarks on the other approach to complete gasification—namely, by the catalysis of water gas. Was he right in understanding that the water gas plant would be operated at various pressures, or would it be, as now, at atmospheric pressure?

Mr. **J. M. Shorrock** (Birmingham), alluding to the statement that oxygen manufacture was only economical when applied to a very large plant, asked the lecturer to state what capacity of plant he had in mind. In regard to the semi-scale plant, he enquired whether there was any other way of getting over the difficulty of packing the fuel, since the method described would be quite difficult to carry out on a full-scale plant.

Mr. **G. E. Stevenson** (Long Eaton) wondered whether the rapid development of gas manufacturing processes in Germany could be attributed to there being adequate supplies of oxygen and hydrogen in that country. He must say that he had a sense of disappointment at the progress made in this country. Regarding high pressure systems, while it was stated that they were perfectly simple, he could scarcely see a man becoming expert in the operation of such processes in less than three years.

Mr. **K. L. Pearce** (Senior Vice-President), moving a cordial vote of

thanks to Dr. Dent, said that close collaboration between members of the Research Board and those whose responsibility it was to handle technical problems in practice was very necessary. Indeed, it was essential that those concerned with the running of gas-works should be acquainted with developments in technical research within the Industry in order that progress could be made. Possibly the mutual interest would result in useful ideas being put forward from the works side. They were indebted to the Research Board for so readily falling in with this policy of keeping the Industry informed of its work, and especially to Dr. Dent for giving them the results of the hard work of himself and his able staff in recent years. They had learned that research meant a great deal of patient and concentrated effort, and that disappointments had to be faced and overcome.

Mr. **E. T. Pickering**, in seconding the vote, said the dissemination of the results of research work was important to the industry concerned, and it was also essential to any research programme. They appreciated Dr. Dent's visit and his happy facility in making the subject alive. The lecture did help them to keep their minds receptive to new ideas, which was most important for the general progress of the Gas Industry.

THE MIDLAND SENIOR MEETING

Mr. **C. F. W. Rendle** (Redditch), who proposed a vote of thanks to Dr. Dent, said that all must have been intensely interested in the excellent lecture, which had a highly scientific atmosphere. The possibilities of the extremely important work upon which Dr. Dent had been engaged must make them all very eager for the further results of his experiments. He wondered if Dr. Dent could indicate—it would, of course, be a personal opinion, for it was too early to be founded on fact—which of the two courses of research was likely to prove the more successful, or the one which it would be the better for them to adopt; that was to say, total gasification on the one hand by hydrogenation or, on the other, by catalysis. Further, having in mind that part of the research which was devoted to the purification of gas from organic sulphur compounds, Mr. Rendle hoped that the research workers would not lose sight of the importance of that in their zest for gasification processes.

Mr. **G. C. Pearson** (Birmingham), in seconding the vote, said that he had been somewhat disappointed in the apparent slow progress of the investigation. Dr. Dent had been engaged on other work during the war, but it appeared that he required more assistants. The whole Gas Industry was waiting for a lead in regard to new processes, and it was hoped that the extensions and modifications that were bound to take place after the war might be influenced by the new technique.

He was very doubtful whether the residue from hydrogenation would be suitable for water gas manufacture, as it contained material down to dust size. In the ordinary water gas process it had proved necessary to use graded coke. However, the introduction of oxygen might make a difference.

Dr. Dent had referred to pressures of from 10 to 50 atmospheres, and, of course, the lowest pressure accompanied by a reasonable yield of products would be finally adopted. However, with a high initial pressure in the production plant, it was understood that this pressure would be retained in the ancillary plant, thus introducing a new technique in the design and working of the latter. A substantial reduction in the size of apparatus would follow, particularly for washers and purifiers, and there would be an improvement in the quality of the products—for example, the liquor should be more concentrated and, if oxygen was employed for purification, a higher sulphur content obtained in it. Also, the pressure could continue to high pressure storage—which, properly designed, should take up much less room than the present low pressure holder. He would like to know if production was flexible enough to meet fluctuations in the demand for gas because, if this were so, the amount of storage required could be substantially reduced. There would also be advantages in the amount of work required on night shifts.

He understood that a pilot plant was now in operation elsewhere and he hoped that, after the intial stages had been determined, a number of such plants would be arranged throughout the country. A special effort should be made to have these plants of large capacity, including ancillaries, so as to allow the investigation of the complete technique to proceed. This would allow a larger number of technical men in the gas profession to accustom themselves to the new practice, and should also accelerate the rate of research. Of course, it would be understood that work on these plants should be co-ordinated by the Gas Research Board. He was sure that Birmingham would welcome such an investigation under Mr. Rhead at their testing station. The question had been discussed as to whether it was possible to construct a works of sufficient size outside the city to replace the existing gas-works. With the present plant this would be an unwieldly proposition, but by adopting these new types of gas-making processes there was a possibility that such a works might eventually be practicable.

Mr. **F. A. Bate** (Birmingham) said he had considerable misgivings when he saw in one of the tables that it was necessary to supply 62,000 cu.ft. of hydrogen to hydrogenate 1 ton of coal. It was difficult to visualize the plant required to produce the necessary hydrogen on even a medium size works. At a later stage in the Paper, however, it was pointed out that hydrogen containing some carbon monoxide would be used, and that it would be possible to obtain such a gas by gasification of the residue from hydrogenation. He thought that point required emphasis.

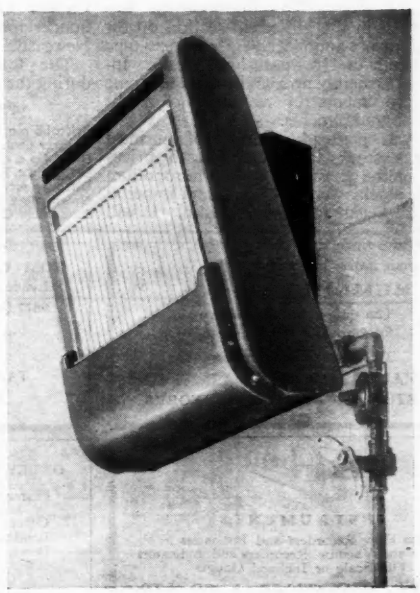
Mr. **Elliot** enquired whether the figure of 70% related to physical or thermal efficiency. If thermal efficiency, did it exclude the generation of the compressed hydrogen, or was it an overall figure? The main constituents of the gas produced would be hydrogen, carbon monoxide, and methane, but could the lecturer give them some idea of the impurities which would have to be removed?

(To be continued)

New Luminous Panel Heater

Immediately prior to and throughout the war there was and has been an increasing demand for overhead radiant heaters, and this form of heating has been installed with very great success in engineering and allied factories.

A demand has arisen for a heater of larger capacity than the standard pre-war products of Messrs. Bratt Colbran, Ltd., and the firm has designed the "Luminous Panel," shown in the accompanying illustration. In designing this heater the firm has constantly borne in mind the type of usage to which it will be put, and the unit is therefore robust and is contained in an enamelled cast-iron frame. The heating unit itself consists of a burner carrying standard luminous jets mounted below a combustion chamber. A low-pressure gas supply only is required. The hot products of combustion are scrubbed by passing up a tapered space formed between a refractory brick and a series of vertical bars manufactured in a special refractory body. This latter has been selected after considerable experience, and is proof against fracture as a result of thermal shock. The bars are therefore virtually unbreakable.



The capacity of the heater is double that of the standard "Portcullis" wall, wedge, and bowl pattern heaters, the input being 25,000 B.Th.U./hr. The overall dimensions are no greater than those of the standard "Portcullis" non-luminous wall type heater and the weight is considerably less, being approximately 60 lb. The whole radiating surface glows and the effect is very pleasing, the glowing brick face being visible through the spaces between the refractory bars. Psychologically this has considerable value, and the effect has been favourably commented upon by workmen during periods of test when sample heaters were running under actual works conditions. It is possible to vary the direction of heat distribution, depending upon the requirements of any individual building, by fixing the heater so that the front face is either vertical or inclined forward (as shown in our illustration). Heaters will normally be fixed at about 10 ft. above floor level.

As an additional precaution, a stout wire guard will be fitted. For the purpose of clarity this is not shown in the illustration.

Naturally a very high temperature is reached, but precautions are taken to keep the back and sides of the heater reasonably cool by allowing air to pass upwards between the actual heating unit and the walls of the heater. This air is discharged into the room through the opening shown at the top of the heater, and in doing so it dilutes the products of combustion on emergence from the top of the panel, directing them also away from the wall face. The heater is governed and control is by lever cock and permanent pilot, but obviously, as in the case of the standard non-luminous heaters, it lends itself equally well to control by thermostat.

These "Luminous Panel" heaters, which are fully patented, will be available on the cessation of hostilities.

GAS PRODUCTS PRICES—STOCKS AND SHARES

The London Market Nov. 6.

There are no changes to report in the prices of Coal Tar Products.

A Government Order came into effect on March 1 controlling the price of Benzole and Coal Spirit and replacing the Control of Coal Tar Naphtha and Xylole Order, 1943.

The Order is known as the Control of Benzole and Coal Spirit Order, 1944 (S.R. & O. 1944, No. 172).*

By this Order the price of Motor Benzole is fixed at 2s. per gallon. The Order also lays down the method of evaluating Crude Benzole.

The Order also calls for periodical returns to the Ministry of Fuel and Power from all producers of Crude and Refined Benzole.

In connexion with the Coal Tar products market, the Government Order designated the Contol of Toluene (No. 4) Order, 1944 (S. R. & O. 1944, No. 170), contains an amendment of the Control of Toluene (No. 3) Order, 1943.

Attention is called to a new Government Order, which amends the price of Toluene as from Sept. 1, 1944. The Order is entitled, The Control of Benzole and Coal Spirit (No. 2) Order, 1944 (S. R. & O., No. 988).

The only change in connexion with the prices of Coal Tar Products refers to Naphthalene. A new Government Order, entitled the Coal Tar Products Prices (No. 2) Order, 1944 (S. R. & O. 1944, No. 1051), allows increases in the maximum prices for all forms of Naphthalene. The new Order came into force on Sept. 22, 1944.

* Slightly amended by Control of Benzole and Coal Spirit (No. 2) Order, 1944, which amendments came into force on Oct. 1.

The Provinces Nov. 6.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 2s. to 2s. 2½d., pure, 2s. 9d. (now controlled by S. R. & O. 1944, No. 988, operative from Sept. 1, 1944. Benzole and Coal Spirit, also Coal Tar Naphtha and Xylole, are now controlled by the Control of Benzole and Coal Spirit Order, 1944, dated Feb. 18, 1944, S. R. & O. 1944, No. 172, operative from March 1, and S. R. & O. 1944, No. 988, part 1, operative from Oct. 1, 1944. Carbolic acid, 60's, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil controlled by the Coal Tar Products Prices Order, 1943, dated Oct. 20, 1943 (S. R. & O. 1943, No. 1528), operative from Nov. 15, 1943. Naphthalene now controlled under S. R. & O. 1944, No. 1051, operative from Sept. 22, 1944.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Scotland Nov. 4.

Market is unchanged with steady throughput for home delivery. Refined tar*: Yield to distillers is 4½d. per gallon *ex* Works, naked. Creosote oil: Timber preserving quality,* 5½d. to 6½d.; hydrogenation oil,* 5⅞d.; low gravity or virgin oil,† 7½d. to 7½d.; benzole absorbing oil,* 6½d. to 8d. per gallon. Refined cresylic acid* is 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha†: 6½d. to 7d. per gallon. Solvent naphtha*: Basic prices delivered in bulk, 90/160 grade, 2s. 8d., and 90/190 Heavy naphtha, Unrectified, 1s. 10½d.; Rectified, 2s. 2d. per gallon. Pyridine†: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

* Price controlled. † Uncontrolled.

A little more activity took place in the stock markets last week. The improvement was most marked in the gilt-edged section on Sir John Anderson's announcement of a new type of short bonds at 1½% maturing in 1950. Industrials were mainly firm, and there were some good improvements in response to recent dividend announcements.

There was a steady volume of business among gas stocks and shares with prices generally on the upgrade. South Metropolitan preference stocks were favoured, and Imperial Continental began to improve again. It will be seen that some sharp rises took place in the Chester Company's stocks, and on support Sunderland stock closed 7 points higher at Newcastle.

The following quotations were changed during the week:

PROVINCIAL EXCHANGES

Bristol 5 p.c. Deb.	122—124	+1
Chester Ord.	105—109	+7
Ditto 4 p.c. Cum. Pref.	90—93	+10½
Ditto 4 p.c. Pref.	89—91	+9
Ditto 3½ p.c. Deb.	88—92	+2
Newcastle 4 p.c. Red. Deb. (x.d.) ...	102—104	Oct. 30
Sunderland Ord.	117—119	+7

OFFICIAL LIST.

Associated Gas & Water 4½ p.c. Red. Cum. Pref.	20/6—21/6	+-/3d.
Cape Town 4½ p.c. Cum. Pref. (x.d.)	5½—6½	Oct. 30
Commercial Ord.	70—75	−2
Croydon Sliding Scale	123—128	+1
Gas Light Units	22/6—23/6	−-/3d.
Imperial Continental	115½—118½	+2½
Montevideo Ord.	86—91	+1
Oriental Cap. Stock	142—147	+2
South Metropolitan 6 p.c. Pref. ...	125—130	+1
Ditto 4 p.c. Pref.	99—102	+3

SUPPLEMENTARY LIST

Croydon 4 p.c. Deb.	99—104	+2

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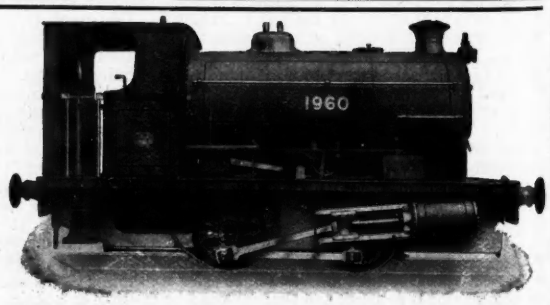

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